IN THE CLAIMS:

1. (Currently Amended) A method, comprising producing an expanded based carbon containing tip including:

growing ~~fabricating~~ a carbon containing expanded base on a substrate; and then

growing ~~fabricating~~ a carbon containing extension on the carbon containing expanded base.

2. (Currently Amended) The method of claim 1, wherein growing ~~fabricating~~ said carbon containing extension includes growing ~~fabricating~~ said carbon containing extension on an apex of said carbon containing expanded base.

3. (Currently Amended) The method of claim 1, further comprising providing a catalyst that is coupled to said substrate before growing ~~fabricating~~ said carbon containing expanded base.

4. (Original) The method of claim 3, wherein the catalyst includes at least one member selected from the group consisting of nickel, iron and cobalt.

5. (Original) The method of claim 3, wherein providing a catalyst includes coating said substrate with an electron beam resist, patterning said electron beam resist, depositing a buffer layer on said substrate, depositing said catalyst on said buffer layer, and removing said electron beam resist.

6. (Original) The method of claim 3, further comprising heating said catalyst to form multiple catalyst droplets.

7. (Currently Amended) The method of claim 1, wherein growing ~~fabricating~~ said carbon containing expanded base includes providing a carbon source gas and an etchant gas.

8. (Currently Amended) The method of claim 7, wherein growing ~~fabricating~~ includes chemical vapor deposition.

9. (Currently Amended) The method of claim 8, wherein growing ~~fabricating~~ includes plasma enhanced chemical vapor deposition.

10. (Currently Amended) The method of claim 9, wherein growing ~~fabrication~~ includes heating said substrate with a cathode to which said substrate is coupled.

11. (Currently Amended) The method of claim 9, wherein growing ~~fabricating~~ includes at least one technique selected from the group consisting of dc glow discharge plasma enhanced chemical vapor deposition, radio-frequency plasma enhanced chemical vapor deposition and microwave plasma enhanced chemical vapor deposition.

12. (Original) The method of claim 7, wherein the carbon source gas includes acetylene and the etchant gas includes ammonia.

13. (Currently Amended) The method of claim 1, further comprising transitioning from growing ~~fabricating~~ said carbon containing expanded base to growing ~~fabricating~~ said carbon containing extension.

14. (Currently Amended) The method of claim 13, wherein transitioning includes reducing the ratio of carbon source gas to etchant gas to effect a transition from expanded base growth to extension growth.

15. (Original) The method of claim 13, wherein transitioning includes lowering a process pressure to effect a transition from expanded base growth to extension growth.

16. (Original) The method of claim 13, wherein transitioning includes changing a plasma power to effect a transition from expanded base growth to extension growth.

17. (Original) The method of claim 13, wherein transitioning includes changing a discharge voltage to effect a transition from expanded base growth to extension growth.

18. (Original) The method of claim 13, wherein transitioning includes changing a process temperature to effect a transition from expanded base growth to extension growth.

19. (Original) An electron emitter made by the method of claim 1.

20. (Currently Amended) An apparatus, comprising an expanded base carbon containing tip including:

a carbon containing expanded base coupled to a substrate; and

a carbon containing extension coupled to said carbon containing expanded base.

21. (Original) The apparatus of claim 20, wherein said carbon containing expanded base is substantially cylindrically symmetrical and said carbon containing extension is substantially cylindrically symmetrical.

22. (Original) The apparatus of claim 21, wherein said carbon containing expanded base is substantially conical.

23. (Currently Amended) The apparatus of claim 22, wherein said carbon containing expanded base defines a substantially solid cone.

24. (Original) The apparatus of claim 22, wherein said carbon containing expanded base defines a substantially hollow funnel.

25. (Original) The apparatus of claim 21, wherein said carbon containing extension is substantially cylindrical.

26. (Original) The apparatus of claim 25, wherein said carbon containing extension defines a substantially solid rod.

27. (Original) The apparatus of claim 25, wherein said carbon containing extension defines a substantially hollow tube.

28. (Currently Amended) The apparatus of claim 20, further comprising another expanded base carbon containing tip coupled to the substrate, the another expanded base carbon containing tip including another carbon containing expanded base coupled to said substrate; and another carbon containing extension coupled to the another carbon containing expanded base.

29. (Original) An electron emitter, comprising the apparatus of claim 20.

30. (New) The apparatus of claim 20, wherein the carbon containing expanded base includes a graphitic carbon film.

31. (New) The apparatus of claim 30, wherein the carbon containing expanded base includes a precipitated carbon film.

32. (New) The method of claim 1, further comprising transitioning from growing said carbon containing expanded base to growing a carbon containing extension by adjusting at least one growth parameter selected from the group consisting of a ratio of carbon source gas to etchant gas, a plasma power, a discharge voltage, a process pressure and a process temperature.

33. (New) The method of claim 1, wherein i) growing said carbon containing expanded base includes simultaneously applying a carbon source gas and an etchant gas to said carbon containing expanded base and ii) growing said carbon containing extension includes simultaneously applying the carbon source gas and the etchant gas to said carbon containing extension.

34. (New) The method of claim 1, wherein the carbon containing expanded base includes a precipitated graphitic carbon film.

35. (New) A method of large-scale production of carbon nanostructures, comprising:
forming a plurality of catalyst dots on a substrate; and
growing a plurality of carbon nanostructures on the substrate with the plurality of catalyst dots.

36. (New) The method of claim 35, wherein the plurality of catalyst dots includes an array of catalyst dots.

37. (New) A plurality of electron emitter made by the method of claim 35.

38. (New) An apparatus, comprising:
a substrate; and
a sharp tip carbon nanostructure coupled to the substrate,
wherein the sharp tip carbon nanostructure defines a tip diameter that is a function of a size of a catalyst droplet.

39. (New) The apparatus of claim 38, wherein the carbon nanostructure defines a height that is grown to a micron size.

40. (New) The apparatus of claim 38, wherein the carbon nanostructure defines a base diameter that is grown to a micron size.

41. (New) An electron emitter, comprising the apparatus of claim 38.

42. (New) A method of producing carbon nanostructures, comprising:
forming a catalyst dot on a substrate; and
growing a carbon nanocone on the substrate with the catalyst dot,

wherein at least one cone parameter selected from the group consisting of location, length, angle and diameter is controlled.

43. (New) The method of claim 42, wherein all of the cone parameters of location, length, angle and diameter are controlled.

44. (New) An electron emitter made by the method of claim 42.

45. (New) An apparatus, comprising:

a substrate; and

a carbon nanostructure coupled to the substrate, the carbon nanostructure defines a base,

wherein there is a mechanically strong connection between the base and the substrate.

46. (New) The apparatus of claim 45, wherein the carbon nanostructure includes a carbon nanocone that is characterized by mechanical stability.

47. (New) An electron emitter, comprising the apparatus of claim 45.